6 CONCLUSIONS

The Lake Toho integrated surface water-groundwater model (ISGM) combines available field data within the project area in an integrated modeling framework based on the MIKE SHE modeling system. The model has been calibrated and validated against field data comprising both groundwater level data and surface water flow and stage data. The model generally has the ability to reproduce measured groundwater table with a precision of 1 foot. The uncertainty on predicted runoff is generally within 10-20%. Considering uncertainties in meteorological data and in runoff measurements this is considered a reasonable uncertainty on predicted runoff. Moreover, the model results have proven to be consistent with other studies conducted in the project area focusing on actual evapotranspiration and vertical flows to and from the Upper Floridan aquifer. Hence, the model has demonstrated the ability to reproduce both measured stage data as well as the overall water balance within the project area. Overall, the model appears to be scientifically sound, consistent and reliable with the ability to predict hydrologic impacts from stresses such as those resulting from drawing down Lake Toho.

The ISGM has been applied to study potential impacts of the Lake Toho drawdown for 10 different scenarios. These scenarios are composed of 5 different climatic conditions representing different combinations of dry, normal and wet conditions. Each climate scenario has then been simulated both with and without lake drawdown. An additional simulation for one climatic scenario has been conducted using a more detailed local model of the Fanny Bass Pond area. The results of the local scale model scenario confirms the findings of the regional scale model, namely that the lake drawdown will not impact the groundwater level at the distances from the lake at which facilities, such as fish farms, are located (including the Sunset Tropicals farm located some 10,000 from the lake shoreline).

Two sensitivity runs were carried out for scenario A.1 and B.1, which represents the worst case conditions. For scenarios A.1 and B.1 simulations were conducted where the horizontal hydraulic conductivity (Kh) of the aquifer were increased with a of factor 2 and 5, respectively. Kh is the key parameter controlling the extent of the impact zone. Increasing Kh by a factor of 5 leads to aquifer properties similar to those of a gravel aquifer (500-600 feet/day), which is far beyond the realistic values for the surficial aquifer in the Lake Toho area. Under such extreme circumstances a small impact (0.2 feet) is simulated at the location of Sunset Tropicals. If Kh is increased with a factor 2 there is essentially no impact at the location Sunset Tropicals. Both scenarios represents surficial aquifer properties well beyond what can be expected and beyond what have been reported elsewhere. Increasing Kh by a factor of 5 leads to highly unrealistic hydraulic properties and causes a substantial overestimation of the impact zone. The scenario, however, illustrates very well that highly unrealistic aquifer properties need to be invoked for the lake drawdown to have any observable impact on the simulated groundwater table at the location of Sunset Tropicals.

The scenarios clearly demonstrate that the drawdown's area of influence is limited to a narrow zone around Lake Toho. The impact zone will not extend beyond 5,000-6,000 feet from the lake shoreline and even horizontal hydraulic conductivities well beyond a realistic level will not make the drawdown's area of influence extend as far as Sunset Tropicals, located about 10,000 feet from the lake shoreline. Climatic conditions rather than the water level in Lake Toho, control the groundwater levels at this and other locations farther from the lake.

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